STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
**COMMISSION ON WATER RESOURCE MANAGEMENT**
P.O. BOX 621
HONOLULU, HAWAII 96809

STAFF SUBMITTAL

COMMISSION ON WATER RESOURCE MANAGEMENT

November 21, 2012
Honolulu, Hawaii

Application for Stream Diversion Works Permit (SDWP.3653.3)
Petition to Amend Instream Flow Standard (PAIFS.3654.3)
Declaratory Ruling No. DEC-ADM12-14
To allow *de minimis* amounts of water (i.e. less than five percent of the annual mean flow of a stream) to be withdrawn from a stream for data collection, research and scientific purposes
Manoa Stream, Honolulu, Oahu (TMK: (1) 2-8-029:015)

APPLICANT:

University of Hawaii
Water Resources Research Center
2540 Doles Street, Holmes 283
Honolulu, NI 96822

LANDOWNER:

City and County of Honolulu

SUMMARY OF REQUEST:

Application for Stream Diversion Works Permit (SDWP.3653.3), Petition to Amend Instream Flow Standard (PAIFS.3654.3) to collect water for three months from Manoa Stream for the University of Hawaii (UH) Water Resources Research Center (WRRC) research project, Manoa Stream, Honolulu, Oahu (TMK: (1) 2-8-029:015).

LOCATION: See Exhibits 1a and 1b.

BACKGROUND:

The applicant would like to collect 350 gallons of water twice a week from Manoa Stream near the UH Hale Noelani dormitory complex for a period of three months for a research project. The applicant's goal is to evaluate the performance of slow-sand filtration (SSF) coupled with two point-of-use devices: (1) an ultra violet (UV) unit and (2) an activated carbon filtration unit impregnated with silver nano-particles for their ability to produce potable water from contaminated surface water.

Slow sand filtration is one of the oldest water treatment technologies used to purify drinking water for communities and individual households. Historically, this method has been used mostly in Europe. Due to its simplicity of design and operation, and low construction, operation and maintenance costs, SSF is a viable option for treating drinking water in developing countries. SSF for families or small communities represents a sustainable technology which is easy to maintain and can be used during natural disasters. SSF reduces turbidity and bacterial counts in water. The removal occurs via biological, physical and chemical processes. During the infiltration of water, a mat or biological matter forms on the sand surface where

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particles are trapped, and organic matter is biologically degraded. As the surface mat develops, it plays an increasingly greater role in purification than does the underlying granular media.

The applicant will filter water from Manoa Stream through two SSF units comprised of 55-gallon plastic barrels filled with silica sand over a four-inch layer of gravel placed at the bottom of each barrel to support the sand. Two fine wire cloths are positioned on top of the gravel to prevent leaching of the sand particles. The sand was repeatedly washed with tap water in order to remove the fines. After filtration through these barrel filters, the water will pass to on of two alternative post treatments.

The applicant's research project will evaluate the use of (1) activated carbon impregnated with silver nano-particles and (2) in-line UV device as possible point-of-use devices to enhance the biological quality of the effluent from the SSF. The activated carbon filter consists of a flow-through PVC column packed with activated carbon impregnated with silver nano-particles. The in-line UV device is a commercial unit, Sune-PureUst-200 Ultraviolet System.

DESCRIPTION:

The applicant will use a Honda WX 15 pump fitted with Spiraflex 1.5 inch internal diameter flexible hoses to collect water from Manoa Stream near the UH Hale Noelani dormitory complex and will transfer the stream water to two 200-gallon storage containers. The flexible hose that will be used to collect stream water is equipped with a rigid perforated head wrapped with fine fiberglass mesh in order to prevent possible entrainment of fine sediment and fish. The proposed sampling technique conforms to the Standard Protocols and Procedure outlined by the USGS. The applicant will use pick-up truck, marked with the UH logo, to transport the water to the College of Engineering on the UH Manoa campus where the filtration units will be located. See Exhibit 2.

The applicant will use a peristaltic pump (positive displacement pump used for pumping a variety of fluids) to simultaneously introduce stream water into both barrels. The applicant will need approximately 100 gallons of stream water daily to run both SSFs and will be conducting tests over a three month period to examine the effect of variability in surface water characteristic, such as turbidity and bacterial count, on the performance of the filter units.

The applicant will collect samples of water going into and effluent leaving each barrel and analyze the samples for turbidity, pH, electrical conductivity (EC), total organic carbon (TOC), total nitrogen (TN), particles, anions, cations, total coliforms and *E. coli*. The applicant will perform the physical and chemical analyses according to the Standard Methods for the Examination of Water and Wastewater.

ANALYSIS:

Agency Review Comments:

The Department of Hawaiian Home Lands (DHHL) had no objections.

The U.S. Fish and Wildlife Service (USFWS), US Army Corps of Engineers (USACE), Department of Health Clean Water Branch (DOH), Office of Hawaiian Affairs (OHA), and the UH Environmental Center did not submit comments as of the date of the preparation of this submittal.

DLNR Review Comments:

| | |
|---|---|
| Historic Preservation: | No historic properties will be affected. |
| State Parks: | Not subject to its regulatory authority or permit. |
| Land Division: | Not subject to its regulatory authority or permit. |
| Engineering Division: | The project site is located in Flood Zone AEF, according to the Flood Insurance Rate map (FIRM) and must comply with the rules and regulation of the National Flood Insurance Program (NFIP). |

Forestry and Wildlife and Land Division had no objections.

Chapter 343 Environmental Assessment (EA) Compliance Review:

EA Triggers: In accordance with HRS §343-5 (a), the applicant's proposed project is exempt from preparing an environmental assessment because the project is considered basic data collection and research, which do not result in a serious or major disturbance to an environmental resource (HAR §11-200-8(5)).

Staff Review

The USGS has a continuous water stage recorder on Manoa Stream at Kanewai Field, which is downstream from the applicant's proposed sampling location. The USGS surface water records cover a period from January 1999 to September 2005 and October 2008 to the current year. According to the USGS, the mean annual flow of Manoa Stream at Kanewai Field is 10.74 cubic feet per second (cfs) or 6.941 million gallons per day (mgd). See Exhibit 3.

The applicant will be pumping water from Manoa Stream at a rate of 25 gallons per minute (gpm), or 0.017 mgd for 10 minutes to collect 350 gallons of water twice a week to meet the 100 gallons per day needs. The water withdrawal rate from Manoa Stream will be 0.055 cfs, which represents 0.5 per cent of the 10.74 cfs annual mean flow of Manoa Stream at Kanewai Field. The 0.5 per cent water withdrawal is below five percent of the annual mean flow (0.537 cfs) which is considered to be *de minimis*, i.e. a minor or insignificant amount. Therefore, a Petition to Amend Instream Flow Standard (PAIFS) is not required.

Staff recommends that the Commission adopt a Declaratory Ruling to allow *de minimis* amounts of water (i.e. less than five percent of the annual mean flow of a stream) to be withdrawn from a stream for data collection, research and scientific purposes.

RECOMMENDATION:

That the Commission:

1. Approve the applicant's Stream Diversion Work Permit (SDWP.3653.3) for a Honda WX 15 pump in Manoa Stream, Honolulu, Oahu within TMK: (1) 2-8-029:015);
2. Allow the applicant to divert up to 350 gallons of water, twice a week, at a pumping rate of 0.055 cfs for three months for data collection and research purposes;
3. Find that the applicant's proposed withdrawal rate 0.017 mgd is considered *de minimis*; therefore, a Petition to Amend Instream Flow Standard (PAIFS) is not required; and
4. Approve Declaratory Ruling No. DEC-ADM12-14 to allow *de minimis* amounts of water (i.e. less than five percent of the annual mean flow of a stream) to be withdrawn from a stream for data collection, research and scientific purposes.

Respectfully submitted,

WILLIAM M. TAM
Deputy Director

| | | |
|---|---|---|
| Exhibits: | 1a and 1b | Location Map |
| | 2. | 55-Gallon Drum Sand Filter and Pumping Apparatus |
| | 3. | USGS Flow Data for Manoa Stream at Kanewai Field, Honolulu, Oahu |
| | 4. | Standard Stream Diversion Works Permit Conditions |

APPROVED FOR SUBMITTAL:

WILLIAM J. AILA, JR.
Chairperson

EXHIBIT 1a

Department of Land and Natural Resources
Commission on Water Resource Management
Stream Protection and Management Branch

## ISLAND OF OAHU

### LEGEND

Streams

- Ephemeral
- Intermittent
- Perennial

☆ (1) 2-8-029:015

This map was produced by the Department of Land and Natural Resources (DLNR), Commission on Water Resource Management for planning purposes. It should not be used for boundary interpretations or other spatial analysis beyond the limitations of the data. Information regarding compilation dates and accuracy of the data presented can be obtained from DLNR.

Datum: North American Datum 1983

Tax Map Key (TMK) layer is comprised of tax assessor parcels derived from paper plat maps with attributes from public tax assessor records and is updated by each respective county.

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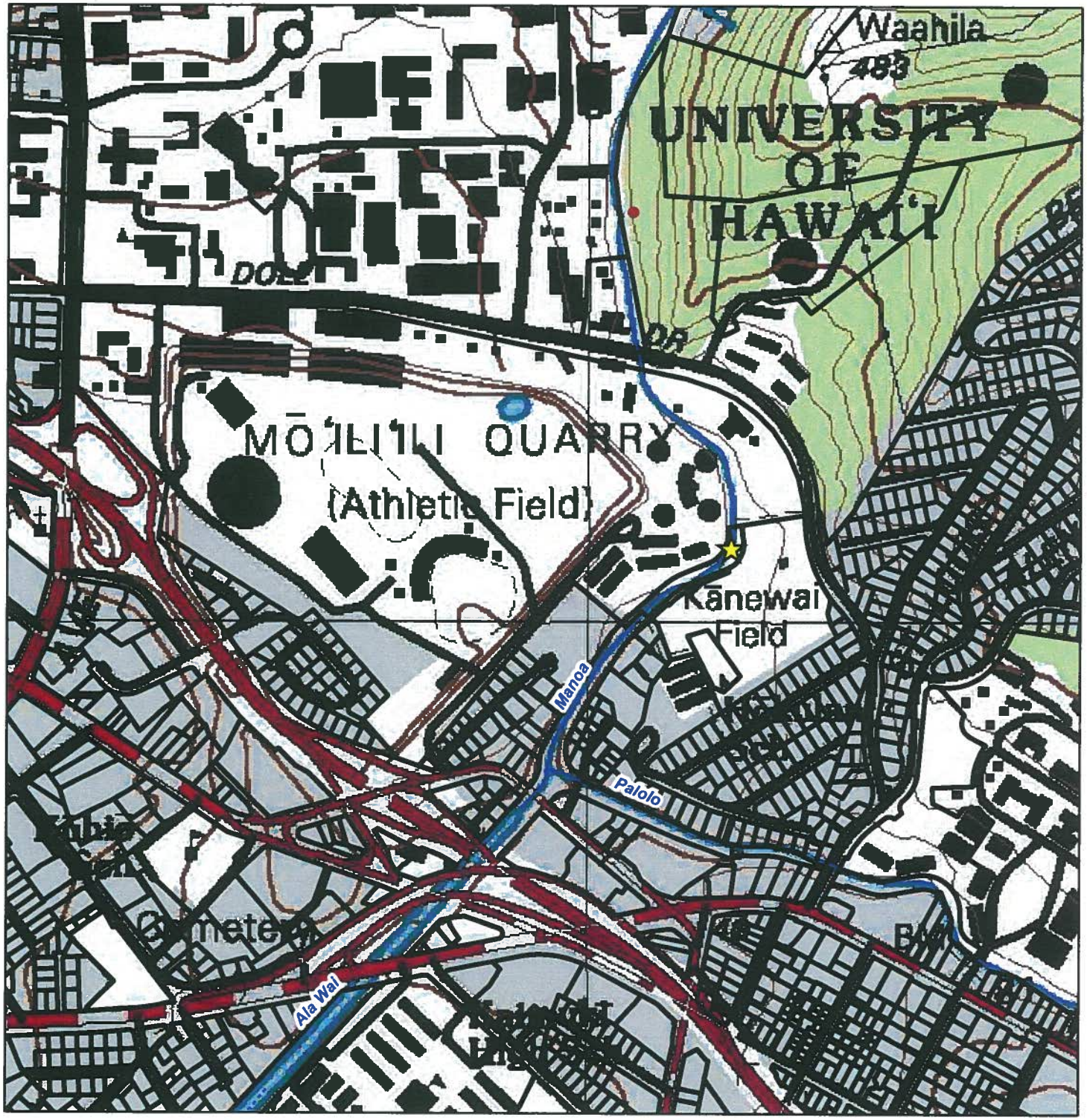
Miles
0 0.025 0.05 0.1 0.15 0.2 0.25



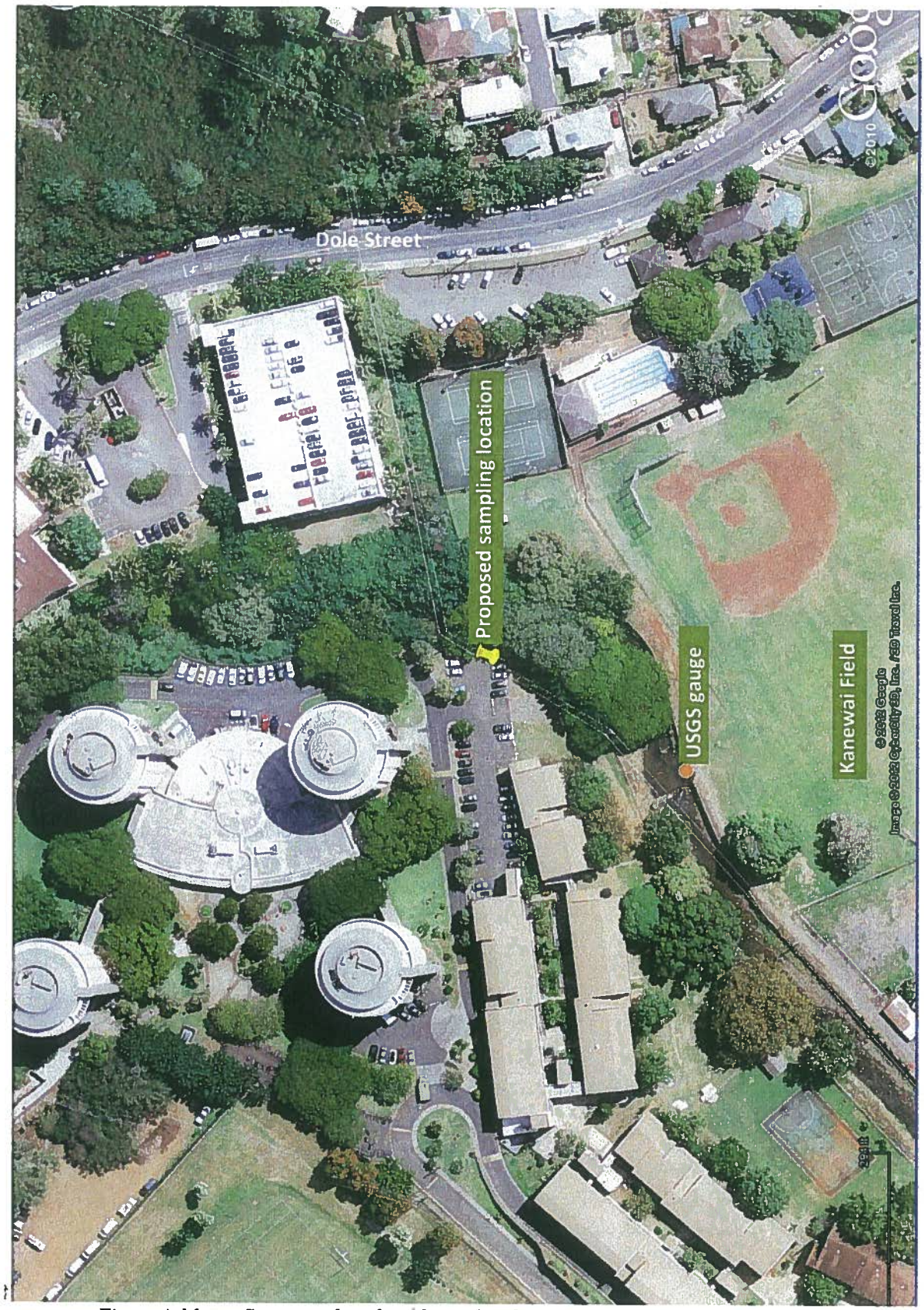



*Figure 4. Manoa Stream at the selected sampling location (*21.293681° N, -157.812405° W*).*

EXHIBIT 1b

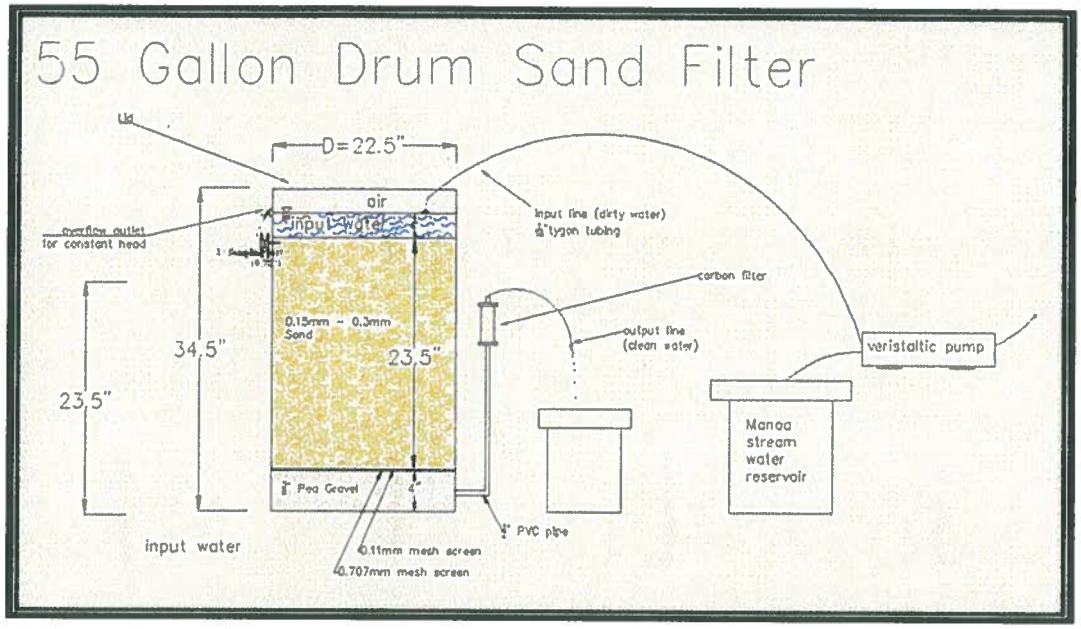



*Figure 1. Schematic rapresentation of a slow sand filter.*

*Figure 2. Apparatus for collecting water from Manoa Stream. It includes a Honda WX15 pump, a green Spiraflex 1-1/2" internal diameter flexible hose with rigid perforated head to collect water from the stream and a blue Spiraflex 1-1/2" internal diameter flexible hose to transfer water into the storage containers located in the truck's bed. A fine fiberglass wire mesh (opening size: 0.25 cm) is wrapped around the head of the flexible hose to prevent entrainment of sediment and fish.*

EXHIBIT 2

## Flow data for Manoa Stream near the proposed sampling location

USGS 16242500 Manoa Stream at Kanewai Field, Honolulu, Oahu, HI
Honolulu County of Hawaii
Hydrologic Unit Code 20060000
Latitude 21° 17' 35.6", 157° 48'45.8"
Drainage area 5.99 square miles

| Day of month | Mean of daily mean values for each day for 9 - 10 years of record in, cfs (Calculation Period 1999-10-01 -> 2011-09-30) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 23 | 13 | 5.8 | 16 | 9.2 | 4.3 | 6.3 | 6.7 | 6.1 | 20 | 15 | 23 |
| 2 | 47 | 14 | 5.8 | 27 | 15 | 4.7 | 5.9 | 7.6 | 5.3 | 8.7 | 9.9 | 22 |
| 3 | 18 | 17 | 6.1 | 16 | 10 | 17 | 7.5 | 11 | 5.1 | 5.7 | 18 | 14 |
| 4 | 12 | 22 | 9.2 | 12 | 9.4 | 14 | 5.5 | 20 | 5.1 | 6.2 | 45 | 12 |
| 5 | 9.1 | 16 | 8.6 | 10 | 13 | 17 | 5.2 | 7.1 | 6.7 | 8.3 | 29 | 29 |
| 6 | 9.4 | 18 | 15 | 20 | 26 | 5.4 | 5.8 | 6 | 5.8 | 7 | 34 | 20 |
| 7 | 7.2 | 18 | 15 | 19 | 27 | 5.7 | 6.8 | 6.6 | 8.7 | 8.5 | 25 | 32 |
| 8 | 6.6 | 17 | 9.8 | 11 | 14 | 4.6 | 7.5 | 5.2 | 5.6 | 5.1 | 12 | 15 |
| 9 | 9.1 | 8 | 29 | 11 | 7.5 | 5.4 | 11 | 6.1 | 5 | 5.7 | 9.9 | 11 |
| 10 | 5.7 | 7.2 | 13 | 12 | 8 | 5.9 | 6.9 | 5 | 7.8 | 5.2 | 7.9 | 28 |
| 11 | 6.4 | 13 | 7.5 | 14 | 9.5 | 5.6 | 11 | 5.2 | 19 | 13 | 7.4 | 45 |
| 12 | 8.3 | 15 | 8.5 | 10 | 7 | 5.9 | 8.4 | 17 | 6.8 | 5.4 | 8.7 | 16 |
| 13 | 11 | 15 | 11 | 8.6 | 6 | 6.1 | 7.5 | 11 | 6.5 | 5.4 | 8.8 | 23 |
| 14 | 7.2 | 15 | 24 | 7.8 | 5.6 | 5.1 | 6.2 | 5.2 | 12 | 6.1 | 27 | 14 |
| 15 | 7.1 | 9.3 | 10 | 8.2 | 6.4 | 4.7 | 6.6 | 4 | 8.4 | 8.5 | 16 | 11 |
| 16 | 8.2 | 6.6 | 13 | 9.7 | 5.1 | 6.8 | 8.2 | 5.5 | 13 | 4.6 | 15 | 9.2 |
| 17 | 6.5 | 6.2 | 13 | 9.1 | 4.9 | 5.8 | 8.8 | 6.5 | 5.9 | 4.7 | 12 | 8.2 |
| 18 | 11 | 6.2 | 6.8 | 8.2 | 6 | 6 | 7.1 | 4.5 | 5.7 | 7.2 | 12 | 7.2 |
| 19 | 26 | 9.4 | 7.5 | 7.7 | 10 | 9.1 | 6.5 | 4.2 | 6.2 | 10 | 15 | 50 |
| 20 | 26 | 7.7 | 8.2 | 14 | 5.7 | 10 | 12 | 12 | 5.5 | 5.3 | 11 | 12 |
| 21 | 15 | 5.3 | 26 | 10 | 8.4 | 8 | 8.9 | 7.6 | 5.3 | 6 | 10 | 9.1 |
| 22 | 9.3 | 5 | 22 | 10 | 6.6 | 9.7 | 8.2 | 5.4 | 6.9 | 3.7 | 18 | 15 |
| 23 | 13 | 4.6 | 18 | 9.1 | 5.3 | 7.9 | 10 | 5.1 | 5.1 | 3.5 | 8.6 | 11 |
| 24 | 7.2 | 6.1 | 11 | 9.1 | 4.6 | 7.6 | 5.4 | 5.5 | 5.1 | 7.4 | 7.1 | 8.3 |
| 25 | 6.6 | 5.5 | 11 | 13 | 4.5 | 6.4 | 5 | 7.1 | 4.9 | 15 | 25 | 11 |
| 26 | 27 | 12 | 15 | 8.6 | 4.3 | 7.6 | 6.9 | 6.6 | 5.5 | 9.4 | 12 | 11 |
| 27 | 13 | 25 | 11 | 8 | 4.1 | 5.1 | 8.2 | 8.5 | 8 | 6 | 19 | 16 |
| 28 | 7.8 | 11 | 8.4 | 7.2 | 4 | 6.1 | 11 | 11 | 5.8 | 10 | 23 | 16 |
| 29 | 48 | 11 | 20 | 13 | 4.3 | 5.5 | 7.8 | 8.1 | 6.5 | 15 | 21 | 9.9 |
| 30 | 15 | | 23 | 7.9 | 4 | 5.9 | 9.7 | 6.8 | 21 | 57 | 13 | 18 |
| 31 | 15 | | 11 | | 4.9 | | 7.5 | 5.5 | | 14 | | 27 |

*Table 1. Mean of daily mean values for each day for 9 – 10 years of record in cfs.*

EXHIBIT 3

| AR | Monthly mean in cfs (Calculation Period: 1999-10-01 -> 2011-09-30) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Calculation period restricted by USGS staff due to special conditions at/near site | | | | | | | | | | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1999 | | | | | | | | | | 6.4 | 7.9 | 21 |
| 2000 | 27 | 5.5 | 4.5 | 16 | 4.87 | 4.1 | 9.6 | 10 | 13 | 9 | 18 | 4.7 |
| 2001 | 3 | 7.4 | 4.6 | 11 | 8.05 | 10 | 4.3 | 10 | 5.6 | 8.4 | 13 | 8.3 |
| 2002 | 25 | 14 | 12 | 5.8 | 15.1 | 4.1 | 6.4 | 5.5 | 4.9 | 5.4 | 6.5 | 3.5 |
| 2003 | 3.5 | 7.7 | 7.1 | 4.4 | 2.25 | 1.9 | 3 | 2.5 | 7.7 | 3.4 | 7.6 | 31 |
| 2004 | 26 | 18 | 37 | 15 | 12.4 | 12 | 10 | 11 | 5.4 | 26 | 33 | 14 |
| 2005 | 18 | 16 | 9.8 | 9.8 | 8.34 | 12 | 14 | 5.7 | 17 | | | |
| 2007 | | | | | | | | | | 9.2 | 25 | 32 |
| 2008 | 18 | | | 19 | 6.75 | 5 | 4.1 | | | 7.6 | 9.2 | 30 |
| 2009 | 11 | 7.2 | 23 | 9.2 | 3.35 | 3.3 | 6.2 | 10 | 3.9 | 8.3 | 16 | 5.5 |
| 2010 | 3.9 | 4.6 | 8.7 | 15 | 5.98 | 4.2 | 10 | 7.2 | 8.7 | 12 | 29 | 28 |
| 2011 | 7.9 | 9.7 | 9.1 | 11 | 16.9 | 17 | 9.4 | 6.4 | 4.3 | | | |
| Mean of monthly discharge | 14 | 10 | 13 | 12 | 8.4 | 7.3 | 7.7 | 7.6 | 7.8 | 9.6 | 17 | 18 |

*Table 2. Monthly mean flow in cfs.*
*(http://nwis.waterdata.usgs.gov/hi/nwis/monthly/?referred_module=sw&site_no=16242500&por_16242500_2=873695,00060,2,1999-01,2012-05&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list)*

| Year | Discharge, cfs |
|---|---|
| 2000 | 10.8 |
| 2001 | 7.98 |
| 2002 | 10.3 |
| 2003 | 4.58 |
| 2004 | 15.7 |
| 2005 | 15.2 |
| 2009 | 10.4 |
| 2010 | 8.18 |
| 2011 | 13.5 |
| Mean of yearly discharge | 10.74 |

*Table 3. Yearly mean flow in cfs.*

STANDARD STREAM DIVERSION WORKS PERMIT CONDITIONS
(Revised 9/19/07)

1. The permit application and staff submittal approved by the Commission at its meeting on November 21, 2012, shall be incorporated herein by reference.

2. The applicant shall comply with all other applicable statutes, ordinances, and regulations of the Federal, State and county governments.

3. The applicant, his successors, assigns, officers, employees, contractors, agents, and representatives, shall indemnify, defend, and hold the State of Hawaii harmless from and against any claim or demand for loss, liability, or damage including claims for property damage, personal injury, or death arising out of any act or omission of the applicant or his successors, assigns, officers, employees, contractors, and agents under this permit or related to the granting of this permit.

4 The applicant shall notify the Commission, by letter, of the actual dates of project initiation and completion. The applicant shall submit a set of as-built plans and photos of the completed work to the Commission upon completion of this project. This permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The proposed work under this stream channel alteration permit shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Commission upon showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Commission no later than three (3) months prior to the date the permit expires. If the commencement or completion date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

5. Before proceeding with any work authorized by the Commission, the applicant shall submit one set of construction plans and specifications to determine consistency with the conditions of the permit and the declarations set forth in the permit application.

6. The applicant shall develop site-specific, construction best management practices (BMPs) that are designed, implemented, operated, and maintained by the applicant and its contractor to properly isolate and confine construction activities and to contain and prevent any potential pollutant(s) discharges from adversely impacting state waters. BMPs shall control erosion and dust during construction and schedule construction activities during periods of low stream flow.

7. The applicant shall protect and preserve the natural character of the stream bank and stream bed to the greatest extent possible. The applicant shall plant or cover lands denuded of vegetation as quickly as possible to prevent erosion and use native plant species common to riparian environments to improve the habitat quality of the stream environment.

8. In the event that subsurface cultural remains such as artifacts, burials or deposits of shells or charcoal are encountered during excavation work, the applicant shall stop work in the area of the find and contact the Department's Historic Preservation Division immediately. Work may commence only after written concurrence by the State Historic Preservation Division.

EXHIBIT 4